

We claim:

1. A gate regulator for controlling swinging of a gate relative to a stationary wall comprising:

5 a. a regulator bracket mounted to a stationary wall and defining a horizontal regulator axis;

b. a mounting plate fastened to a gate that is swingable between first and second positions relative to the wall; and

c. means for controlling the gate to swing about a

10 horizontal gate axis without restriction in a first direction from the first position toward the second position, and to swing with restriction in a second direction from the second position toward the first position.

15 2. The gate regulator of claim 1 wherein the means for controlling the gate comprises:

a. a fluid cylinder having a first member pivotally connected to the regulator bracket, and a second member connected to the mounting plate; and

20 b. means for cooperating with the cylinder to control the gate to swing without restriction in the first direction, and to swing with restriction in the second direction.

25 3. The gate regulator of claim 2 wherein the means for cooperating with the fluid cylinder comprises:

a. a fluid reservoir;

b. first and second lines connecting the fluid reservoir to the cylinder; and

c. means for permitting unrestricted flow of fluid

30 between the reservoir and the cylinder when the gate is swinging in the first direction and for resisting flow of the fluid between the reservoir and the cylinder with the gate is swinging in the second direction.

35 4. The gate regulator of claim 1 further comprising means for overriding the means for controlling the gate when the gate swings in the second direction and reaches a gate third position to enable the gate to swing without restriction from the third position to the first position.

5. The gate regulator of claim 4 wherein the means for overriding comprises:

- a. a cylinder pin on the fluid cylinder second member;
- b. a lug on the mounting plate that defines a generally

5 L-shaped slot that receives the cylinder pin, the L-shaped slot having first and second slots that meet at a junction, a selected one of the first and second slots receiving the cylinder pin when the gate is swinging in the second direction; and

10 c. means for releasing the selected slot from the cylinder pin when the gate is swinging in the second direction and is at the gate third position,

so that the gate swings without restriction in the second direction from the third position to the first position.

15 6. The gate regulator of claim 5 wherein:

a. the first slot receives the cylinder pin when the gate is at the first position, the junction receives the cylinder pin when the gate is swinging in the first direction, and the second slot receives the cylinder pin when the gate is swinging in the

20 second direction; and

b. the means for releasing the selected slot releases the second slot from the cylinder pin when the gate is at the third position thereof.

25 7. The gate regulator of claim 6 wherein the means for releasing the second slot comprises:

a. a trip arm rotatable on the cylinder pin; and

30 b. a cable cooperating with the trip arm to slide the cylinder pin along the second slot of the L-shaped slot to the junction when the gate is at the third position thereof and thereby release the lug from the cylinder pin.

8. The gate regulator of claim 7 wherein the cable is adjustable on the trip arm.

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9. The gate regulator of claim 7 wherein:

a. the trip arm has first and second beams;

b. the cable has a first end that is immovable relative to the stationary wall, and a second end connected to the trip arm

second beam; and

c. the cable rotates the trip arm on the cylinder pin and the fist beam acts as a fulcrum on the mounting plate to slide the cylinder pin along the second slot when the gate is at the third position thereof.

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10. The gate regulator of claim 9 further comprising means for adjusting the cable on the trip arm second beam and thereby adjusting the gate third position.

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11. The gate regulator of claim 5 wherein the means for releasing the selected slot of the L-shaped slot comprises:

15 a. a trip lever on the cylinder pin; and
b. a stop arm on the cylinder pin that cooperates with the trip lever to slide the cylinder pin along the selected slot to the junction and release the selected slot from the cylinder pin when the gate is the third position thereof.

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20 12. The gate regulator of claim 11 wherein:

a. the trip lever is in contact with the stationary wall when the gate is at the third position thereof;

b. the stop arm is in contact with the mounting plate when the gate is at the third position thereof;

25 c. the stop arm and the trip lever cooperate to hold the cylinder pin stationary relative to the stationary wall as the gate swings in the second direction from the second position thereof toward the third position; and

30 d. the selected slot of the L-shaped slot slides over the cylinder pin until the junction is at the cylinder pin to thereby release the second slot from the cylinder pin.

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13. Apparatus for transporting and unloading selected material comprising:

35 a. a box;
b. a gate swingable on the box about a gate axis between open and closed positions; and
c. means for regulating the gate to swing without restriction from the closed to the open position thereof and to swing with restriction from the open to the closed position.

14. The apparatus of claim 13 wherein the means for regulating the gate comprises:

a. a fluid cylinder having a first end held to the box for pivoting about a regulator axis that is non-concentric with the gate axis, and a piston rod;

b. a cylinder pin in the piston rod;

c. a mounting plate fastened to the gate that receives the cylinder pin; and

d. means for controlling the cylinder to enable swinging of the gate from the closed position to the open position without restriction and to restrict swinging of the gate from the open position to the close position.

15. The apparatus of claim 14 further comprising means for overriding the means for controlling the cylinder when the gate is swinging from the open position toward the closed position and is at a release position between the open and closed positions to enable the gate to swing freely from the release position to the closed position.

20 16. The apparatus of claim 15 wherein the means for overriding comprises:

a. a lug on the mounting plate that defines a generally L-shaped slot that receives the cylinder pin and having first and second slots that meet at a junction; and

b. means for sliding the cylinder pin within a selected one of the first and second slots to the junction when the gate is at the release position to release the lug from the cylinder pin and thereby enable the gate to swing freely from the release position to the closed position.

30 17. The apparatus of claim 16 wherein the means for sliding the cylinder pin comprises:

a. a trip arm rotatable on the cylinder pin; and

b. a flexible cable between the trip arm and a selected member that is stationary relative to the box, the cable rotating the trip arm on the cylinder pin to slide the cylinder pin within the selected slot to the junction when the gate is at the release position to release the lug from the cylinder pin and thereby enable

the gate to swing freely from the release position to the closed position.

18. The apparatus of claim 17 wherein:

- 5 a. the trip arm has first and second beams;
- b. the cable is connected to the trip arm second beam;

and

- c. the trip arm first beam acts as a fulcrum on the mounting plate when the cable rotates the trip arm.

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19. The apparatus of claim 17 wherein the cable is adjustable on the trip arm to thereby adjust the gate release position.

15 20. The apparatus of claim 16 wherein the means for sliding the cylinder pin comprises:

20 a. a stop arm on the cylinder pin that is in contact with the mounting plate when the gate is at the release position thereof; and

25 b. a trip lever on the cylinder pin that is in contact with the box when the gate is at the release position thereof, the trip lever cooperating with the stop arm to hold the cylinder pin stationary relative to the box as the gate is swinging from the open position toward the closed position and the selected slot of the L-shaped slot slides along the cylinder pin until the junction is at the cylinder pin to release the lug from the cylinder pin when the gate is at the release position thereof.

30 21. The apparatus of claim 20 wherein:

a. the stop arm and trip lever rotate together in the piston rod;

35 b. the trip lever rotates out of contact with the box when the gate is at the open position thereof; and

c. the stop arm cooperates with the mounting plate to limit the rotation of the trip lever when the gate is at the open position thereof.

22. In combination with a box having upstanding walls; and a gate that swings on the walls about a gate axis between open and closed positions,

a gate regulator comprising:

- a. a regulator bracket mounted to a selected box wall and defining a regulator axis;
- 5 b. a fluid cylinder pivotable about the regulator axis and having a cylinder pin;
- c. a mounting plate fastened to the gate that receives the cylinder pin; and
- 10 d. means for controlling the fluid cylinder to enable swinging the gate from the closed to the open position without restriction, and to restrict the swinging of the gate from the open to the closed positions.

23. The combination of claim 22 further comprising means for overriding the means for controlling the fluid cylinder when the 15 gate is at a release position between the open and closed positions to enable the gate to swing freely from the release position to the closed position.

24. The combination of claim 23 wherein the means for overriding the means for controlling the fluid cylinder comprises:

- 25 a. a lug on the mounting plate defining an L-shaped slot that receives the cylinder pin, the L-shaped slot having first and second slots that meet at a junction, a selected one of the first and second slots receiving the cylinder pin when the gate is swinging from the open position toward the closed position thereof; and
- b. means for releasing the lug selected slot from the cylinder pin when the gate is at the release position thereof.

25. The combination of claim 24 wherein the means for releasing the lug comprises:

- a. a trip arm rotatable on the cylinder pin; and
- 30 b. a flexible cable having a first end tied to a member that is stationary relative to the box walls, and a second end connected to the trip arm, the cable cooperating with the member to rotate the trip arm on the cylinder pin and slide the cylinder pin along the selected slot of the L-shaped slot to the junction when the gate is at the release position thereof and thereby release the selected slot from the cylinder pin.

26. The combination of claim 25 wherein the cable is
adjustable relative to the trip arm to thereby enable adjustment of
the gate release position.

5 27. The combination of claim 25 wherein the trip arm
comprises:

- a. a first beam that connects to the flexible cable; and
- b. a second beam that contacts the mounting plate and
acts as a fulcrum when the trip arm rotates on the cylinder pin to
slide the cylinder pin along the selected slot.

10 28. The combination of claim 24 wherein the means for
releasing the lug selected slot comprises:

- a. a trip lever on the cylinder pin and in contact with a
selected box wall when the gate is at the release position thereof;
and
- b. a stop arm on the cylinder pin and in contact with the
mounting plate when the gate is at the release position thereof and
cooperating with the trip lever to hold the cylinder pin stationary
relative to the box walls as the gate swings from the open position
toward the closed position,

20 so that the selected slot slides along the cylinder pin
until the junction is at the cylinder pin to thereby release the
selected slot from the cylinder pin when the gate is at the release
position thereof.

25 29. A method of controlling the swinging of a gate in box
comprising the steps of:

- a. swinging a gate without restriction from a closed
position to an open position;
- b. controlling the gate to swing with slow control from
the open position to a release position; and
- c. swinging the gate freely from the release position to
the closed position.

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30. The method of claim 29 comprising the further step of
adjusting the gate release position.

31. The method of claim 29 wherein:

a. the step of swinging a gate comprises the step of providing a gate with an L-shaped slot thereon having first and second slots that meet at a junction; and

5 b. the step of controlling the gate comprises the steps of:

i. providing a fluid cylinder having a cylinder pin;

10 ii. receiving the cylinder pin in a selected one of the first and second slots of the L-shaped slot when the gate swings from the open position toward the closed position; and

15 iii. releasing the selected slot of the L-shaped slot from the cylinder pin when the gate is at the release position thereof.

32. The method of claim 31 wherein the step of releasing the

15 selected slot comprises the steps of:

a. providing a trip arm on the cylinder pin;

b. rotating the trip arm on the cylinder pin and simultaneously sliding the cylinder pin along the selected slot to the junction of the L-shaped slot.

20 33. The method of claim 31 wherein the step of rotating the trip arm comprises the steps of:

a. connecting a flexible cable between the trip arm and a selected member that is stationary relative to the box; and

25 b. tightening the cable as the gate swings from the open position to the release position and rotating the trip arm with the tight cable as the gate approaches the release position.

34. The method of claim 33 comprising the further step of adjusting the cable on the trip arm and thereby adjusting the gate release position relative to the closed position.

30 35. The method of claim 33 wherein the step of releasing the selected slot comprises the steps of:

a. providing a trip lever and a stop arm on the cylinder pin;

35 b. contacting the trip lever with the box, and contacting the stop arm with the mounting plate; and

c. holding the cylinder pin stationary relative to the box, and sliding the selected slot over the cylinder pin until the junction of the L-shaped slot is at the cylinder pin and thereby releases the selected slot from the cylinder pin.